Trustees felt themselves justified in making the transfer. Although this collection is now at the University, its ownership remains with the Trustees.

9. There has been no change in the Board during the year, by death or otherwise.

10. Annexed to this Report are the following Appendices :—

I.—Annual Balance-sheet.
II.—Attendance of Visitors.
III.—Attendance of the Trustees.
IV.—Work done by Taxidermist and Articulator.
V.—Specimens collected.
VI.—Specimens purchased.
VII.—Exchanges.
VIII.—Donations.
IX.—Books acquired.
X.—Duplicate Books.
XI.—Mr. Ramsay's Report.

(Signed) ALFRED STEPHEN,
Crown Trustee and Chairman

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Special Board for Medicine have presented to the Vice-Chancellor the following Report with a view to its communication to the Senate :—"The Board have considered the requirements of the Previous Examination from the point of view of its suitability as a preliminary examination for students entering on the study of medicine, and have come to the conclusion that in the interests of mental training these requirements may with advantage be modified. They would desire to see introduced an adequate examination in the elementary mechanical principles of Physics, meaning thereby—the fundamental notions of matter, motion, and energy, and the simple laws which govern their relations ; the physical properties of matter in the solid, liquid, and gaseous states ; and the application of these properties and laws in the case of simple instruments and machines. An examination in these principles need not involve any but the most elementary mathematics, yet it could be made to exercise the student in clearness of conception, in accuracy of statement, and in soundness of reasoning. These qualities are in a special degree essential to students of medicine, but from our Report of November 11, 1885, it would appear that in these respects the preliminary training of many who propose to become students of medicine has not been satisfactory. The subject we propose is already well taught and appreciated in many good schools, and it appears to us extremely desirable that the University should encourage all schools to improve themselves in this direction by including the subject in its Previous Examination. It is not for the Board to say whether the subject should form part of the Previous Examination proper (though many considerations might be urged for this plan), or be required as an additional subject in place of the present examination in Elementary Mechanics. They are, however, persuaded that, if introduced in some form, the examination would be for all students at least of equal value to the present examination in additional subjects, and for students whose work at the University is to consist largely in the study of nature it would be of considerably greater value."

Mr. H. D. Rolleston, of St. John's College, has been appointed Assistant Demonstrator of Physiology, in succession to Mr. Green. Mr. Rolleston was placed in the First Class in the Natural Sciences Tripos, Part I., in the Easter Term, 1885.

SCIENTIFIC SERIALS

Annalen der Physik und Chemie, No. 12, December 1885.—J. Fink, on the influence of pressure on the electric resistance of electrolytes. Cailletet's apparatus was used for producing compression, Kohlrausch's induction apparatus for the electric measurements. A solution of hydrochloric acid (5·02 per cent.), having a resistance of 7·490 Siemens' units at 1 atmo., fell to 7·335 at 200, and to 7·126 at 500 atmos. A weaker solution (0·98 per cent.) showed a diminution of 7·39 per cent. in its resistance at 500 atmos. A similar solution of zincic sulphate showed a diminution of 11·74 per cent. The diminution is proportional up to 300 atmos.—E. Edlund, on the transition-resistance in the voltaic arc. The conclusion is against the existence of such a resistance.—K. Wesendonck, on the fluorescence of naphthalin-red.—H. W. Vogel, on the relation between absorption by colouring matters and their sensitising action on bromide of silver.—G. Kötschau, studies on fluid motions. Some very extraordinary figures are produced by careful introduction of a coloured liquid into an uncoloured one.—F. Himstedt, a determination of the ohm. This paper describes the method, depending on a knowledge of the coefficient of mutual induction of two coils, which has already been discussed by Lord Rayleigh, and which is similar to that of Roiti. The final result gives as equivalent to the ohm a column of mercury of 1 square millimetre section and 105·98 centimetres length.—W. B. Brace, on the magnetic rotation of the plane of polarisation, and some special cases of refraction. It is shown that there may be in a calc-spar crystal three rays which suffer no double refraction. Experiments are also described concerning prisms of heavy glass in a magnetic field.—G. Stern, position of the commutator in electro-dynamic machines. A discussion of Clausius' formulæ with respect to the relation of the current to the angle of lead.—E. Mach and J. Wenzel, a contribution to the mechanics of explosions.—K. L. Bauer, apparatus for demonstrating that electricity resides only on the surface of a conductor. This is a modification of Biot's apparatus, consisting of two coaxentric hemispheres, and convenient means of insulating and discharging.

Journal of the Russian Chemical and Physical Society, vol. xvii. fasc. 7.—On the part played by contact actions in the phenomena of dissociation, by D. Konovaloff.—Thermic data for some combinations of the aromatic series, by E. Werner, being numerical data as to the heat of neutralisation of saligenin and oxybenzoic aldehydes and acids, and mellic acid.—On the oxidation of oleic and elaidic acids by permanganate of potassium, by A. Saytzeff.—Notes by MM. Albitzky, Nikolsky, and Ustinoff.—On the motion of a solid body having cavities filled with a homogeneous liquid, by M. Joukowsky, being the second part of a mathematical inquiry into ellipsoidal, cylindrical, and such other cavities as have the shape of a rotation-body, and also several cavities connected together.—On the collision of absolutely solid bodies, by M. Schiller, second part, being a further mathematical development of the theory, together with answers to Prof. Joukowsky's observations.—On the influence of an electric current on the resistance of selenium and its sensibility to light, by N. Hesehus, being an explanation of the experiments of Fritts by the theory of allotropic dissociation.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, December 17, 1885.—"On the Formation of Vortex-Rings by Drops falling into Liquids." By Prof. J. J. Thomson, M.A., F.R.S., and H. F. Newall, M.A.

When a drop of ink falls into water from not too great a height, it descends through the water as a ring, in which there is considerable rotation about the circular axis passing through the centres of its cross-sections ; as the ring travels downwards, inequalities appear, and the ring breaks up into a number of smaller rings, which in turn may again subdivide.

It is shown that capillarity plays no essential part in the formation of the rings ; in fact, it may be said that, with very few exceptions, rings are formed only when a liquid is dropped into one with which it can thoroughly mix. There are very many cases in which rings are formed when there is no possibility of capillary action, such as when the liquid into which the drop falls is the same as the drop itself.

The drops were observed by instantaneous illumination ; and it was seen that the drop enters the liquid as a sphere, becomes flattened as it descends, and finally breaks into a ring more than half an inch below the surface.

When a sphere moves through a liquid, the tangential velocity of the liquid is different from that of the sphere. If the sphere be a liquid drop, there is no absolute discontinuity in the motion, but only a very rapid change, so that there is a finite alteration in a very small distance. This is equivalent to a vortex-film covering the sphere, the lines of vortex-motion being horizontal circles. If the liquid be viscous, the vorticity will diffuse inwards and outwards. The drop, as it falls, becomes flattened, on account of the resistance to its fall ; and if by

the time it becomes disk-shaped the drop is full of vortex-motion, the disk must break up—for it is an unstable arrangement of vortex-motion—and assume the stable arrangement, namely, that of the anchor-ring. Then the most important property of the liquid involved is its viscosity. If this is too small, the vortex-motion will not have time to spread far by the time the drop has become disk-shaped; whilst if the viscosity is too great, the vortex-motion will all be dissipated before the drop becomes disk-shaped.

To avoid complication, experiments were made in which drops were let fall into liquid of the same kind as that composing the drop. Liquids so treated were found to arrange themselves into four classes, distinguishable by the character of the ring formed. The quotient μ/ρ was determined for each of the liquids—μ being the coefficient of viscosity found by Poiseuille's capillary tube method, and ρ the density, water being the standard in both cases. It was then found that the four classes were also distinguishable by the value for μ/ρ.

Thus in Class I. ether, chloroform, and carbon bisulphide give rings only very uncertainly, the drop breaking up and spreading irregularly through the column of liquid. For these μ/ρ is not greater than 0·7.

To Class II. belong water, alcohol, turpentine, paraffin, and other liquids; these give the best rings: and for them the value of μ/ρ is between 1 and 3.

For Class III. μ/ρ is between 3 and probably 8 or 10: and this class includes moderately viscous liquids, such as butyl-alcohol, amyl-alcohol, fairly strong sulphuric acid, and diluted glycerine. In these cases the rings form very slowly.

Class IV. includes all the most viscous liquids, like strong solutions of sugar, potash, sulphuric acid, glycerine. The value of μ/ρ is much larger (about 15 to 30), and no ring is formed at all, unless special precautions are taken to get very large drops.

It is pointed out that nothing can depend on the absolute value of μ/ρ, since it has the dimensions of the product of a length and a velocity. The naturally comparable length in the system is the size of the drop. It is shown that diminishing the size of the drop has the same effect as increasing the value of μ/ρ. The velocity of the drop is probably the comparable velocity; but this cannot be varied much without introducing large disturbances.

The more complicated problem of a drop of one liquid falling into a vessel of a different liquid is treated briefly, and the analogy of the diffusion of vortex-motion with the conduction of heat is referred to; μ/ρ, in the present problem, corresponding with the diffusivity in the conduction of heat.

The breaking up and subdivision of the rings is shown to depend on (1) motion in the column, which brings about irregularities in the ring, when the vortex-motion has nearly or quite died out; (2) the difference of density of the liquids composing the drop and the column, on account of which the parts of the ring, in which most of the liquid is gathered, fall most quickly, and give rise to rings in the same way as that in which the original ring was formed. Strong evidence is adduced to show that capillarity is not concerned in the subdivision.

Instances in which a small surface tension exists are also referred to, and figures of some curious cases are given.

The paper closes with a section in which it is shown that a connection exists between the depth to which a ring travels in the column and the form of the drop at the moment of impact at the surface of the column.

January 14.—Abstract of a Paper "On the Action of Sunlight on Micro-organisms, &c." By Arthur Downes, M.D.

In previous memoirs (*Proc. Roy. Soc.*, 1877–8–9), of which preliminary notes appeared in NATURE, Dr. Downes, with the collaboration of Mr. T. Blunt, showed that sunlight was fatal to Microsaprophytes by a process of hyper-oxidation thereby induced.

In this process the more refrangible rays were the most active. In the course of the induction which led to this conclusion two other facts of importance were elicited. The molecule of oxalic acid was speedily resolved into water and carbonic acid by the combined effect of light and free oxygen, and a typical representative of the diastases, the invertive ferment of cane-sugar, had its qualities completely destroyed by sunlight, which was, however, without effect in a vacuum or a neutral atmosphere.

During the past eight years evidence confirmatory of these conclusions has accumulated from various sources, and the principal facts are reviewed by the author.

After referring to the observations of Warington and others on the nitrifying ferment, of Tyndall in regard to the insolation of putrefiable infusions under an Alpine sun, and to others, Dr. Downes summarises the recent results of Duclaux, who finds, from an examination of several species, that *Micrococci* are apparently far more sensitive to sunlight than the more resistant *spore-forming Bacilli*. Duclaux, who has likewise observed the destructive effect of sunlight on a diastase, agrees that this injurious action on germs is an affair of oxidation. In his previous papers the author had noted the different powers of resistance of various organisms to sunlight, notably of *Saccharomycetes* or *Mucedines*, as compared with *Bacteria*. He now describes a specially resistant *Bacterium*, roughly resembling, but not identical with, the *Ascobacterium* of van Tieghem, of which he finds no previous record.

In refuting the conclusion of Jamieson, an Australian observer, that both he and Prof. Tyndall had mistaken effects of heat for effects of radiant energy distinct from heat, Dr. Downes describes recent experiments of his own, which indicate that a similar action, though of course in a less degree, is exercised by diffused light. He concludes with a reference to the well-known observations of Pringsheim on the destruction of vegetable protoplasm by the more refrangible rays, and claims them as evidence of the truth of his former generalisation that the hyperoxidation of protoplasm by light is a general law from the action of which living organisms require to be shielded by a variety of protective developments of cell-wall, aggregation of tissue or colouring matter, and in other ways.

January 21.—"On the Clark Cell as a Standard of Electromotive Force." By Lord Rayleigh, M.A., D.C.L., Sec.R.S.

This paper, supplementary to that "On the Electrochemical Equivalent of Silver, and on the Absolute Electromotive Force of Clark Cells" (*Phil. Trans.*, part 2, 1884), gives the further history of the cells there spoken of, and discusses the relative advantages of various modes of preparation. The greatest errors arise from the liquid failing to be saturated with zinc sulphate, in which case the electromotive force is too high. The opposite error of *super*-saturation is met with in certain cases, especially when the cells have been heated during or after charging. Experiments are detailed describing how cells originally supersaturated have been corrected, and how in others the electromotive force has been reduced by the occurrence of supersaturation consequent on heating. If these errors be avoided, as may easily be done; if the mercury be pure (preferably distilled *in vacuo*); and if either the paste be originally neutralised (with zinc carbonate), or a few weeks be allowed to elapse (during which the solution is supposed to neutralise itself), the electromotive force appears to be trustworthy to 1/1000 part. This conclusion is founded upon the comparison of a large number of cells prepared by the author and by other physicists, including Dr. Alder Wright, Mr. M. Evans, Dr. Fleming, Prof. Forbes, and Mr. Threlfall.

As regards temperature coefficient, no important variation has been discovered in saturated cells, whether prepared by the author or by others. In all cases we may take with abundant accuracy for ordinary applications—

$$E = 1{\cdot}435\{1 - 0{\cdot}00077\,(t - 15^{\circ})\},$$

the temperature being reckoned in Centigrade degrees. For purposes of great delicacy it is advisable to protect the standards from large fluctuations of temperature. Under favourable circumstances two cells will retain their relative values to 1/10,000 for weeks or months together.

Unless carefully sealed up, the cells lose liquid by exudation and evaporation, and then the electromotive force gradually falls. Marine glue appears to afford a better protection than paraffin-wax, and there seems to be no reason why cells thus secured should not remain in good order for several years.

In cells of the H-construction (§ 29 of former paper), the leg containing the amalgam (but not the one containing pure mercury) is liable to burst, apparently in consequence of a tendency to alloy with the platinum. Protection with cement of the part of the platinum next the glass has been tried, but no decisive judgment as to the adequacy of this plan can as yet be given.

Recent cells, intended for solid zincs, have been made of a simplified pattern—nothing more, in fact, than a small tube with a platinum wire sealed through its closed end. The zincs are not re-cast, and the paste is prepared from (unwashed) mercurous sulphate rubbed up in a mortar with *saturated* solu-

tion of zinc sulphate and a little zinc carbonate. A stock of paste may be prepared and retained for use in a bottle.

Experiments are described tending to prove that the irregularities observed during the first few weeks of the life of a cell prepared with acid materials have their origin principally at the mercury electrode.

Cells prepared with dilute solutions have a lower temperature coefficient (about 0·00038), but would be more difficult to use as standards whose value is to be inferred from the mode of preparation.

Details are given of H-cells charged with amalgams of zinc and mercury in both legs, without mercurous sulphate. A very small proportion of zinc is sufficient to produce the maximum effect. Pure mercury, neither alloyed with zinc nor in contact with mercurous sulphate, has an uncertain electromotive value.

Since the comparison of cells does not absolutely exclude a small general alteration of electromotive force with age, further determinations of the standard cell (No. 1) have been effected by means of the silver voltameter. The results—

TABLE XVIII.

Date	E.M.F. of No. 1 at 15° C. in B.A. volts.
October 1883 to April 1884	1·4542
November 1884	1·4540
August 1885	1·4537

are very satisfactory, and indicate a constancy sufficient for almost all practical purposes.

Finally, some comparisons are given between Clark cells and Daniells, with equi-dense solutions, both of Raoult's pattern and of that described recently by Dr. Fleming.

Entomological Society, January 20.—Fifty-third Anniversary Meeting.—Mr. R. McLachlan, F.R.S., President, in the chair.—An abstract of the Treasurer's accounts was read by Mr. H. T. Stainton, F.R.S., one of the auditors, and the Secretary read the report of the Council.—The following gentlemen were then elected as the Council for 1886:—President: Robert McLachlan, F.R.S.; Treasurer: Edward Saunders, F.L.S.; Secretaries: Herbert Goss, F.L.S., and the Rev. W. W. Fowler, M.A., F.L.S.; Librarian: Ferdinand Grut, F.L.S.; other Members of Council: T. R. Billups, Edward A. Fitch, F.L.S., F. Du Cane Godman, M.A., F.R.S., W. F. Kirby, E. B. Poulton, M.A., F.G.S., H. T. Stainton, F.R.S., S. Stevens, F.L.S., and J. Jenner Weir, F.L.S.—The President then delivered an address, and a vote of thanks to him was moved by Mr. Stainton, and seconded by Mr. F. Pascoe, and the President then replied. A vote of thanks to the officers was then moved by Mr. J. W. Dunning, and seconded by Mr. Distant, and Messrs. Saunders, Fitch, Kirby, and Grut replied. This was the first annual meeting since the incorporation of the Society by Royal Charter.

Zoological Society, February 2.—Prof. W. H. Flower, V.P.R.S., President, in the chair.—Mr. W. B. Tegetmeier, F.Z.S., exhibited and made remarks on a Pheasant from the Persian borders of Transcaucasia.—Mr. C. A. Wright, F.Z.S., exhibited a Dove of the genus *Turtur* from Malta, and identified it as a semi-albino variety of *Turtur auritus*.—Mr. Sclater exhibited, on behalf of Mr. W. H. Dobie, a young specimen of Sabine's Gull (*Xema sabinii*), which had been obtained at Mostyn, on the coast of Flintshire.—Mr. Seebohm exhibited a specimen of Ross's Sea-Gull (*Larus rossi*) obtained in June last in the neighbourhood of Christianhaab, Disco Bay, Greenland.—Capt. R. G. Wardlaw Ramsay exhibited and remarked on a specimen of a new bird of the genus *Copsychus* obtained by Mr. H. Pryer in North-Eastern Borneo, which he proposed to call *C. niger*.—A communication was read from Prof. R. Collett, C.M.Z.S., containing an account of the external characters of the Northern Fin-Whale (*Balænoptera borealis*), based upon the examination of numerous specimens of this whale killed on the coast of Norway during the past summer.—A communication was read from Dr. G. Stewardson Brady, F.R.S., containing descriptions of some new freshwater Entomostracous Crustaceans from South Australia.—Dr. H. Woodward, F.Z.S., communicated, on behalf of Dr. Monticelli, a catalogue of the species of Bats found in South Italy.—Mr. R. B. Sharpe, F.Z.S., read the first of a series of notes on birds in the Hume Collection. The present communication treated of the specimens supposed to belong to the Hawfinch of Europe, which had been collected at Attock, and showed that they belong to a different species, which Mr. Sharpe proposed to call *Coccothraustes humii*.—Mr. F. E. Beddard read the third of his series of notes on the Isopoda collected during the voyage of H.M.S. *Challenger*. The present paper completed the preliminary description of the new species of this group collected during the voyage, which amounted altogether to about forty-five in number.—Mr. J. H. Leech, F.Z.S., exhibited and described specimens of a Butterfly from Mogador, which he referred to a variety of *Anthocharis eupheno*.

Geological Society, January 27.—Prof. T. G. Bonney, F.R.S., President, in the chair.—H. Kirby Atkinson was elected a Fellow, and Prof. Gustav Tschermak, of Vienna, a Foreign Member of the Society.—The following communications were read:—On the fossil Mammalla of Maragha, in North-Western Persia, by R. Lydekker, F.G.S.—On the Pliocene of Maragha, Persia, and its resemblance to that of Pikermi, in Greece; on fossil elephant-remains of Caucasia and Persia; and on the results of a monograph of the fossil elephants of Germany and Italy, by Dr. H. Pohlig. Communicated by Dr. G. J. Hinde, F.G.S.—The Thames Valley surface-deposits of the Ealing district and their associated Palæothic floors, by John Allen Brown. Communicated by A. Ramsay, F.G.S.

Victoria (Philosophical) Institute, January 18.—Rev. Dr. Thornton in the chair.—A paper upon "A Samoan Tradition of Creation and the Deluge" was read by the Rev. T. Powell, F.L.S. Mr. Powell said he thought the Samoans were of Semitic origin; and if Hebrew characters had been used instead of the Roman alphabet for the writing of their language, the triliteral, Semitic nature of the language, in which hundreds of words were identical with Hebrew, would have been obvious.

MANCHESTER

Literary and Philosophical Society, November 3, 1885.—Prof. W. C. Williamson, LL.D., F.R.S., President, in the chair.—On the different arrangements in a state of maximum density of equal spherical granules, by R. F. Gwyther, M.A.—Note on the velocity with which air rushes into a vacuum, and on some phenomena attending the discharge of atmospheres of higher, into atmospheres of lower, density, by Mr. Henry Wilde. Since the reading of my paper before the Society on the efflux of air, I have thought that it might be useful to recapitulate, briefly, the fundamental grounds upon which my experiments and the general reasoning thereon were based. This appears to me to be further necessary, from the dual sense in which the term "velocity" may be considered in the discharge of elastic fluids: the term, as I have already pointed out, has been applied by some, indifferently, to express the rate of increase of volume after leaving the aperture, and the velocity of the stream through the aperture before expansion. It is in the latter sense that the term is used in my paper, and the velocities shown in the several tables have been calculated on this basis. The application of the laws of discharge of inelastic fluids to those which are elastic is a natural principle of reasoning sufficient for us to assume a theoretic velocity for air rushing into a vacuum of 1332 feet per second; and the corollary to this proposition, that the velocity of efflux through the aperture into a vacuum is the same for all pressures above and below that of the atmosphere also follows, naturally and directly, from the reciprocal relations of the elasticity and density of the homogeneous atmosphere. But, just as the theoretic velocity of discharge of water and other inelastic fluids is diminished by the opposing motions and friction of the issuing stream of particles, so that the amount of discharge is only ·62 of that required by theory; so from the varied mobility of different gases there was an antecedent probability that an ideal law would not prevail for the velocity with which air has been assumed to flow into a vacuum. Hence, just as the hydraulic coefficient ·62, expressing the actual amount of efflux through a hole in a thin plate, could only be arrived at by experiment; so by experiment only could the actual velocity with which the atmosphere rushes into a vacuum be ascertained. This velocity, therefore, as determined by experiment, may be represented by the coefficient ·77 for the contracted vein. Or, $V = 77 \times 1332 = 1025$ feet per second. From Tables I. and II. it appears that the corollary of the equality of the velocities for all pressures, when air flows into a vacuum, is not strictly applicable for the lower pressures, but is approximately true for pressures above 120 lbs. That air of lower density acts as a vacuum to the discharge into it of air of higher density, under certain conditions, is a truth so well established from the experiments described as to require no further proof, but, that the reduction of temperature at the orifice of the discharging vessel did not sensibly affect the velo-

city of the air through the orifice under such con litions, was evident from an inspection of the tables, and more particularly of Table V., where a pressure of six atmospheres acts as a vacuum to a pressure of nine atmospheres. In this experiment it will also be seen that 21·22 cubic inches of air, of a constant density of nine atmospheres (the equivalent of 5 lbs. of pressure), were discharged successively into a vacuum and into atmospheres of increasing densities up to six atmospheres, when the several discharges were made in equal times, viz. 7·5 seconds. Now, the velocity for this time, as shown in Table I., is 1210 feet per second for the contracted vein, and as the times were equal, so were the velocities equal, for the successive discharges up to six atmospheres. The velocity for low pressures, as I have shown in Table III., is compounded of the rate of discharge into a vacuum and the resistance of the atmosphere, and approximates to the square roots of the pressures. For effective pressures below 1 lb. above the atmosphere the rates of discharge are as the square roots of the pressures, as has been shown by Dr. Joule in the paper previously referred to. That the phenomenal rates of discharge which I have described are manifested whenever slight differences of pressure exist between the discharging and receiving atmospheres, may be inferred from the familiar experiment of fixing a perforated disk of cardboard by its centre to the end of a small metal tube or a piece of tobacco-pipe; when a similar plain disk, placed on, or against the other, instead of being driven off by a jet of air blown through the pipe, is attracted to it.

SYDNEY

Linnean Society of New South Wales, October 28, 1885.—Mr. C. S. Wilkinson, F.L.S., Vice-President, in the chair.—The following papers were read:—Notes from the Australian Museum, by R. von Lendenfeld, Ph.D. Note 1.—The vestibule space of *Dendrilla cavernosa*. In this note a very remarkable structure is described; the sponge forms wide ramified tubes with thin walls; and the terminations of these tubes are closed by sieves, as in *Euplectella*. Rings of sensitive and ganglia cells are described round the pores in this membrane. Gland cells similar to those of other *Aplysillidæ* are also described. Note 2.—*Raphyrus hixonii*, a new gigantic sponge from Port Jackson. A sponge, weighing over 400 lbs., was recently dredged in Port Jackson. A detailed description of it is given in this note. The author wishes to keep the two genera *Papillina* and *Raphyrus*, combined by O. Schmidt and Norman, distinct. He has found, besides the spicules known of the European species, two other kinds in this Australian sponge. The structure of the whole sponge is reticulate, as in the Aulenin æ. Remarkable, very granular, amœboid cells, which are very abundant around the inhalant lacunes, are described as digestive cells. Note 3.—*Halme tingens*, n.sp. A sponge with peculiar staining qualities. This is a sponge from Thursday Island, which becomes blue after some time, and stains paper, &c., placed in the same spirit with it a remarkably dark blue. The spirit remains light yellow. The author thinks that this colour might be turned to practical account. Note 4.—A case of mimicry. Four sponges are described and photographed in this note. Two are *Ceraospongiæ*, and two are *Monactinellæ*. The two former belong to the genus *Chalinopsis*, R. von L.; the two latter to the genus *Dactylochalina*. The author agrees with Vosmaer that the horny sponges have descended from the *Monactinellid* siliceous sponges. Forms like those described connect the two groups. Their similarity in external appearance is considered a case of mimicry. Whilst the internal structure changed, and the sponge lost its spicules, it kept up a close resemblance to the ancestral siliceous sponge which was defended by its spicules. The case is a very interesting one.—Descriptions of some new or rare Australian fishes, by E. P. Ramsay, F.R.S.E., and J. Douglas-Ogilby. The species here described are *Pteroplatea australis*, *Sebastes scaber*, and *Platycephalus arenarius*, all new species, and *Cirrhitichthys graphidopterum* and *Lepidotrigla pleuracanthica*, species previously known.—On the genus *Trachichthys*, by J. Douglas-Ogilby. A full description and synonymy of the genus is here given, the author expressing an opinion that the *T. australis*, Shaw, and *T. jacksonensis*, Macleay, are the same species.—Catalogue of Australian Coleoptera, part ii., by George Masters. The families catalogued in this part are the *Dytiscidæ*, *Gyrinidæ*, *Staphylinidæ*, *Pselaphidæ*, *Paussidæ*, *Scydmænidæ*, *Silphidæ*, *Trichopterygidæ*, *Scaphidiidæ*, *Histeridæ*, *Phalacridæ*, *Nitidulidæ*, *Trogositidæ*, *Colydiidæ*, *Rhysodidæ*, *Cucujidæ*, *Cryptophagidæ*, *Latridiidæ*, *Mycetophagidæ*, *Dermestidæ*, *Byrrhidæ*, *Georyssidæ*, *Parnidæ*, *Heteroceridæ*—in all, 970 species.—The Plagiostomata of the Pacific, part iii., by N. de Miklouho-Maclay and William Macleay, F.L.S. Three fishes are here described: (1) A *Heterodontus* from the Chinese Seas, identified as the true *Heterodontus zebra* of Gray, hitherto looked upon as a synonym of *H. phillippi*; (2) a species of ray (*Myliobatis punctatus*), taken in 1879 in the Lub or Hermit Islands, north of the Admiralty Group; and (3) a ray from Sorry Island, north-west of the Admiralties, which is placed in a new genus of the *Trygonidæ*, and named *Discobatis marginipinnis*.—Fourth addendum to the Monograph of the Australian Hydromedusæ, by R. von Lendenfeld, Ph.D. In this paper a new species of Hydra is described, which possesses six arms, and on them cells, which the author considers more nearly allied to the Palpocils of Sarsia (Schulze) than the ganglia cells of Hydra.—Prof. Selenka's researches into the development of the American opossum, by R. von Lendenfeld, Ph.D. Prof. E. Selenka's most important discoveries regarding the concupiscence and the commencement of the development of the embryo of this marsupial are enumerated in this short preliminary report.—Second note on Macrodontism, by N. de Miklouho-Maclay. The author states his opinion about the very large teeth which he has observed in natives of different islands of Melanesia. The results of observations during his last two trips (1879 and 1882) to the Admiralty and Lub Islands is the conclusion that the enlargement of the teeth is nothing but an *excessive accumulation of a special kind of tartar* deposited on the incisors and canines of the upper and lower jaw.—Note on the "Kéu" of the Maclay Coast, New Guinea, by N. de Miklouho Maclay. On the authority of the late Dr. R. Scheffer, Director of the Botanical Garden of Buitenzorg, Java, the author states that *two* species of *Piper*, allied to *Piper methysticum*, but different from it, were brought by him in 1873 from the Maclay Coast. The author gives a full description of the preparation of the "Kéu"-drink on the Maclay Coast, as well as of the effects of the same, which are more soporific than intoxicating. He adds further some remarks about the general use of the "Kava" root (*Piper methysticum*) throughout the islands of the Pacific.

PARIS

Academy of Sciences, February 1.—M. Jurien de la Gravière, President, in the chair.—On the theory of Mitchell's screw-pile, and on the "vrille," a small apparatus terminating in a sort of conic screw, used for making the scarfs of borings with the screw-pile, by M. H. Resal.—On the measurement of the velocity with which vibrations are propagated in the ground, by MM. F. Fouqué and Michel Lévy. They describe an instrument which they have invented for the purpose of automatically recording the velocity of propagation, as well as the intensity and duration of vibrations such as those produced by the blow of a Nasmyth hammer.—Note on some hyperelliptical formulas, by M. Brioschi.—Report on M. Romieu's work entitled "Essai sur les décans égyptiens," by M. Jules Oppert. In this work the author has endeavoured with partial success to determine the names of the thirty-six so-called "decans," stars which played such a large part in ancient Egyptian astronomy.—Determination of the constant of astronomic refraction by meridian observations (continued), by M. A. Gaillot.—On the integrals of total differentials of the second species, by M. E. Picard.—Geometrical theory of the articulated hyperboloid, by M. A. Mannheim.—Experimental verification of a new geometrical representation of the colour-sensations, by M. R. Feret. After establishing certain properties of the colour-sensations, and founding on them the principles of a new diagram representing these sensations, the author proceeds to show that the results furnished by experience harmonise at all points with those anticipated theoretically. But although the theory leads to the same equations as those already determined by Maxwell, it differs essentially from them in so far as it is founded on the rule of the parallelogram, and is independent of the notion of the three fundamental colours.—Thermic researches on hypophosphoric acid, by M. A. Joly. The thermic properties of the two hydrates of phosphoric acid already determined are compared with those of the various hydrates of phosphoric and arsenic acid, the study of which the author has now completed. Hypophosphoric acid is further compared with the other acids of phosphorus and arsenic by studying its saturation with an alkaline base, and two metallic bases, the oxide of manganese and the oxide of silver.—Note on the indicators of the different energies of the polybasic acids, by M. R. Engel.—A study of chlorophyll, in connection with M. Regnard's induction that the

chlorophyll function, that is, the property of decomposing carbonic acid in the light, is of a purely chemical order, inherent to chlorophyll, and continuing to act apart from the physiological conditions, by M. Victor Jodin. Without denying this conclusion the author recalls certain former experiments, which apparently point at a different result, and which should be taken into consideration in order to establish a general theory of chlorophyll based on all the known facts.—On the morphology of the ovary in insects, by M. Armand Sabatier.—A contribution to the anatomy of the Chloræmidæ, by M. Et. Jourdan.—Observations in connection with M. Köhler's recent note on a new species of Balanoglossus, by M. G. Pouchet. It is shown that this species is identical with that which MM. de Guerne and Barrois found in abundance in 1880 in the Island of Loch (Glenans Archipelago), and is also probably the same as that found in 1879 by M. de Lacaze-Duthiers at Frez-Hir, Finisterre.—On the optical properties of some fibrous minerals, and on some critical species (arseniosiderite, wawellite, vadiscite, davreuxite, hydrated anthophyllite, hydrotephroite of Langlan, Sweden), by M. A. Lacroix.

BERLIN

Physiological Society, November 27, 1885.—Dr. Benda spoke on mammalian spermatogenesis. The results recently communicated to the Society by Dr. Biondi (NATURE, vol. xxxii. p. 544), of his investigation into the genesis of spermatozoa, had, in view of their divergence from the ideas of earlier observers, induced Dr. Benda to examine the subject more closely. By application of the best hardening and staining methods he had obtained precisely the same figures as had all earlier observers. In particular, through the preparations he had made from rats, bulls, and dogs, he had convinced himself of the actual existence of Ebner's spermatoblasts. Upon a large cell arising from the wall of the canal, the foot-cell, a thin stalk projects, on which was situated an oval formation consisting of small flaps. In his interpretation of this stalk, however, Dr. Benda differed from Ebner, taking the spermatoblasts as he (Dr. Benda) did, for a heap of daughter-cells connected by the stalk with the foot-cell. He further deviated from earlier observers in assuming that the foot-cell originated from a large wall-cell provided with a quiescent nucleus, which interiorly developed a process with which the daughter-cell then united into the spermoblasts. Not till later on did the spermatozoa appear. Examinations of a large series of different kinds of animals would enable a plan to be taken of all the stages of spermatogenesis.—In the discussion which followed the address, Prof. Waldeyer urged that the type of the spermatogenesis, as described by Dr. Biondi, namely, that of cell-columns with progressive development from the interior outwards of the spermatozoa out of cell-nuclei, proved conclusively in the case of the rat, might possibly not hold good for all kinds of animals. It was possible that in other kinds of animals the several stages passed, not successively, but simultaneously and less distinctly, one from another, so that whole knots of cells may be involved in the same stage of development. A subsequent conjunction of daughter-cells with the process of a foreign cell seemed to him improbable.—Dr. Müllenhof presented a series of photographs of horses in movement, prepared by Herr Anschütz in execution of a commission from the Royal Ministry of War. One series exhibited the successive positions of the horse in the act of springing; another in the act of trotting. Dr. Müllenhof followed this up with some observations on the way in which these images were obtained, and drew special attention to certain positions in the body of the animal.—Dr. Wolffberg described a case of abnormal single vision which had recently come under his observation. A man of sound health in every respect complained that for some time he was constantly seeing two objects of the same kind, or very similar to each other, as a single object when they were lying beside each other. It made no difference what was the form of the objects, whether they were letters of the alphabet, numbers, strokes, crosses, and so on. In all these cases he saw the two objects constantly as a single object when they stood at a short distance from each other. In a horizontal position the two objects might be placed at a greater interval from each other than in a vertical position, in order to be seen by him as a single object. The position of the singly seen image was always that of the fixed object. The single seeing of two objects was confined to the macula lutea. If the objects were not entirely alike, but only very similar to one another, then did they likewise appear as one. If they had different colours, then were they likewise seen as one object with rivalry of colours. In the eyes of the patient the existence of no objective anomaly could be established. By way of explanation of this hitherto unobserved phenomenon, Dr. Wolffberg called to mind the physiological phenomena of normal single seeing in the case of two images striking identical spots of the retina, and of abnormal single seeing in the case of objects in the circle of vision which did not indeed hit identical spots of the retina, but yet appeared as single. The physiological abnormal single seeing in this latter case respected, however, only objects to which attention was not turned, which were not fixed, and in such contingency the images appeared always between the two objects. If, then, the physiological single seeing, in the case of non-identical spots of the retina being hit, distinguished itself so far from the above-mentioned pathological condition, it yet had in common with the pathological condition the rivalry of the colours, the single seeing of similar objects, and the greater interval in horizontal than in vertical directions. In the opinion of the speaker, the observed pathological condition was due to a psychical cause, and was to be classed in the category of illusions.

BOOKS AND PAMPHLETS RECEIVED

"Le Sens des Couleurs chez Homère": Dr. de Keersmaecker (Lebèque, Brussels).—"Die Lebendige Kraft und ihr Mass": Dr. Max Zewerger (J. Lindauer, München).—"Widerstand und Maschinenleistung der Dampfschiffe": E. Rauchfuss (Lipsius und Tischer, Kiel).—Electro-Deposition": A. Watt (Lockwood and Co.)—"A Guide to the Examination of the Nose": E. C. Baber (Lewis).—"Alkali Tables," 2nd Edition: O. Bell (Lockwood and Co.).—"Practical Introduction to Chemistry": W. A. Shenstone (Rivingtons).—"Attack and Defence as Agents in Animal Evolution": C. Morris (Philadelphia) —"Les Orages en Russie": A. Klossovsky (Odessa).—"On a New Zealand Fungus that has of late become a Valuable Article of Commerce" W. Colenso.—"The Apparent Movements of the Planets": W. Peck (Archibald and Peck, Edinburgh).—"Beobachtungen über die Dämmerung insbesondere über das Purpurlicht und seine Beziehungen zum Bishop'schen Sonnenring": Dr. A. Riggenbach (Georg's Verlag, Basel).

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